## **Question Paper**

Exam Date & Time: 08-Dec-2023 (02:30 PM - 05:30 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

## FIFTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV-DEC 2023

**BIOMEDICAL INSTRUMENTATION-II [BME 3152]** 

Marks: 50

Duration: 180 mins.

Α

## Answer all the questions.

Instructions to Candidates: Missing data may be suitably assumed

1)		Explain the type of chromatography based on column partition principle and explain the same in detail. Also mention one application of the same.	(4)
	A)		
	B)	Explain in detail, a type of lithotripsy which is more affective in the treatment of calculi of bladder.	(4)
	C)	What are the different ways in which heat loss can take place from the body of neonates? What are the measures taken to minimize heat loss from the infant's body?	(2)
2)		Determine the process of signal conditioning and memory storage that the ultrasound signal undergoes before it is given to the display device.	(4)
	A)		
	В)	Why is Time-Gain Compensation (TGC) required in ultrasound? With a suitable TGC curve, discuss the various TGC controls that are normally adjustable by the sonographer.	(4)
	C)	It takes 0.2ms for the sound from the ultrasound probe to travel to a baby's heel and back again. If the sound travels at 1500m/s inside the body, how far is the baby's foot below the mother's skin?	(2)
3)		Determine the advantages of thermography over other methods and also, compare the different detectors used in thermographs.	(4)
	A)		
	B)	Illustrate how the electrical conductivity change can be used for counting blood cells.	(4)
	C)	In the coulter counter method, the orifice resistance, when there is no blood cell of any type in it, is $1K\Omega$ . A single RBC in the orifice increases its resistance to $1.01K\Omega$ . What will be the output voltage $V_{out}$ each time an RBC passes into the orifice? The bias voltage is Vbb= 10V.	(2)
4)		Illustrate a type of oxygenator where bubbles are used to increase the gas transfer efficiency. Also mention the drawbacks of using this type of oxygenators.	(4)
	A)		
	B)	Determine the characteristics of the ideal heart lung machine.	(4)
	C)	Give a comparison of natural and artificial lungs in terms of atleast four parameters.	(2)
5)		Illustrate with a neat figure, how the five basic functions are performed in the dialysis unit.	(4)
	A)		

- B) Compare the coil type and parallel plate dialyzers.
- C) What are the features needed to be incorporated in the dialysis membrane for it to work efficiently? (2)

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